CHAPTER 2

Alternatives

CHAPTER 2

ALTERNATIVES

I. INTRODUCTION

This chapter describes three alternatives that wholly or partially meet the purpose and need identified in Chapter 1, and a No Action Alternative. In addition, three other alternatives that were not studied in detail are described.

Alternatives were designed to meet the issues identified during scoping, while at least partially meeting the purpose and need defined in Chapter 1, and represent a reasonable range of actions to accomplish those goals. This chapter concludes with a comparison of the effects and their ability to fulfill the purpose of the proposed action. This information, along with the Chapter 4 disclosure of the projected environmental consequences of each alternative, enables the decision maker to make a reasoned choice between alternatives.

II. ALTERNATIVE DEVELOPMENT PROCESS AND PUBLIC INVOLVEMENT

Alternatives were developed based on issues, concerns, and topics identified through internal scoping and public involvement and are designed to address and define those issues.

Comments from the public and other agencies have been used in defining the environmental issues and in preparation of the environmental assessment (EA).

A Public Involvement Plan was developed at the first Interdisciplinary Team meeting on March 13, 1997.

A legal notice describing the project and requesting comments was published in the Ravalli Republic on March 25, 1997, and again on April 1, 1997.

The scoping notice was also sent to 13 organizations and 40 individuals and groups on March 25, 1997. Nine comment letters were received.

A videotape was developed to display the affected environment and to present issues and concerns for the Tin Cup and Bass Lake Dam projects to groups and individuals who may not be able to visit the project sites. This videotape is available for viewing at the Stevensville Ranger Station.

III. ENVIRONMENTAL ISSUES

The following issues have been identified as the result of scoping:

A. Dam Safety

What is needed to keep the dam in a safe operating condition that will meet federal and state standards while providing irrigation water for the dam owners? Will all engineering and technical dam work comply with the

Federal Guidelines for Dam Safety? What are the risks involved with delaying portions of the proposed actions?

B. Preserving Wilderness Values

How can the dam be repaired to safety standards while preserving and protecting wilderness values? This includes minimizing effects on wilderness resources and values; effects on the area surrounding the dam; the length of time required to complete the project (duration of the impact); effects to recreation users; and the feasibility of using primitive/historical tools instead of motorized equipment. What are the minimum tools necessary to complete the work? What will the effects be at the dam and base camp site? Related concerns include: duration of impacts, location of the camp site, camp management, the effects of livestock use, amount of workers and livestock, and staging/storage areas.

C. Watershed/Aquatic Ecosystems

What effects will the Tin Cup Dam outlet replacement and drilling have on the watershed and aquatic ecosystems? This includes the effects of the dam repair on soil and wetlands, water quality, and fisheries in Tin Cup Creek and Tin Cup Lake Reservoir.

D. Vegetation

How will the project affect the spread of noxious weeds and what impacts will there be to native vegetation? This issue addresses noxious weed introduction and spread.

E. Economics

What will the project and the alternatives cost, and how can expenses for the dam owner and the government be minimized? What will the effects of the alternatives be on the supply of irrigation water for dependent ranches?

IV. ALTERNATIVES CONSIDERED BUT NOT GIVEN DETAILED STUDY

A wide variety of alternatives were explored and considered, to meet the purpose and need for action, and to be responsive to the issues. Four alternatives were considered and eliminated from detailed study:

A. **Watershed restoration to bring Tin Cup Creek nearer to natural, pre-European conditions.** This alternative was recommended by the Friends of the Bitterroot. This alternative was not considered in detail because restoration of the entire Tin Cup watershed is beyond the scope of the analysis for the proposal. The majority of the watershed is within wilderness, and the only major affect to the watershed is the dam. The Forest Service does not have the authority to remove the dam unless the dam is not meeting safety standards.

B. Complete the core drilling and soil sampling early in summer. Depending on results, possibly no other work would be needed until 1998. This alternative was also recommended by the Friends of the Bitterroot. This alternative was not considered in detail because it is known that some level of pipe repair work is needed in 1997 in order to meet safety standards. The results of the sampling will determine the repair work that is needed in 1998. Completing the pipe repair work and the core drilling concurrently would minimize and confine disturbance. An alternative that will minimize the 1997 work by only patching the pipe in 1997 and then postponing the outlet pipe replacement until 1998, when other repair work may be needed, will be considered in detail (Alternative 4).

C. Delay all the work until 1998. This alternative was suggested by Wilderness Watch to concentrate the effects to wilderness to one time period. This alternative was not considered in detail because it is important that the pipe repair and the debris removal be completed in 1997 in order to meet safety standards. It is also important for the dam owners to complete the investigations of the dam interior, so they can plan their 1998 work. An alternative that would do the minimal amount of repair work in 1997 will be considered in detail (Alternative 4).

ALTERNATIVES TO BE CONSIDERED IN DETAIL

A. Description of Alternatives Considered in Detail

1. Alternative 1 - No Action. With this alternative, only routine maintenance would be completed. Without repair work, the dam would not meet safety standards, and it would be removed or would not be permitted to hold water.

2. Alternative 2 - Proposed Action. This is the proposal requested by the Tin Cup Water Company and described in Chapter 1. Mitigation measures to minimize the environmental effects would be included with this alternative, and they are listed later in this chapter. These mitigation measures would be designed to address the environmental issues listed in Section III of this chapter. Equipment to be used with this alternative is listed in Chapter 1. Project duration would be approximately two weeks.

3. Alternative 3 - Proposed Action With Use of Horses. This alternative was designed to be responsive to the environmental issues, especially the issues related to preserving wilderness values. This alternative would be the same as the Proposed Action and would use the same equipment, including the helicopter, but draft horses would be used to accomplish the tasks that would be accomplished by the Bobcat backhoe in Alternative 2. Also, crosscut saws would be used instead of chainsaws. The other motorized equipment listed in the Proposed Action is needed to meet the purpose and need for action. A temporary corral would be built for four horses. A six person crew would be required instead of four. Project duration would be approximately three weeks.

There is a possibility that draft horses will not be able to pull the plastic pipe sleeve through the existing masonry and culvert outlet. There is a limited amount of clear space downstream from the outlet for the horses to pull within. Also, the bends, alignment, and joints within the existing outlet may cause obstructions and may require a motorize winch attached to the backhoe. If the horses are unable to pull the pipe through, the Bobcat backhoe will need to be flown in with this alternative.

4. **Alternative 4 - Defer New Pipe Installation Until 1998.** This alternative was suggested by Wilderness Watch, and it is designed to be responsive to the environmental issues, especially the issues related to preserving wilderness values. Core drilling, pipe patching, and debris removal would occur in 1997, but new pipe installation would be deferred one year. The sampling of the rip rap would also be deferred for a year. This alternative would complete the minimal repair and sampling work in 1997, and postpone the new pipe installation until 1998, when other repair work may be needed. This would reduce the 1997 effects to wilderness resources, and may serve to concentrate the effects in 1998, depending on the 1998 proposed action. The outlet pipe replacement would occur in 1998, and only minimal patching to meet safety needs would be completed in 1997. Equipment needs with this alternative are the same as Alternative 2, but the equipment used for the pipe installation and rip rap sampling would be used in 1998 instead of 1997. Project duration would be approximately one week in 1997 and two weeks in 1998.

B. Features Common to All Action Alternatives

All alternatives would meet the safety and construction requirements established by the Federal Guidelines for Dam Safety and by the Forest Service.

Risk Assessment and Mitigation Measures

The Interdisciplinary Team identified project-specific mitigation measures and other plans and specifications that would be required under any action alternative. A Risk Assessment was completed to help identify risks and mitigation measures. Mitigation measures are applied to reduce or avoid adverse effects resulting from management activities.

Table 2.1 Risk Analysis

Potential Risk	Possible Consequences	Risk Level	Mitigations	Risk Level After Mit.
Fuel spills	Stream Pollution Soil Pollution	low-mod	fuel storage site w/dike, fabric,pallets	low
Inclement Weather	cost overruns, extends length of project,impacts on wilderness & resources	mod	early mobilization,early reservoir drawdowns,contact meteorologist, cover fuel storage	low
Helicopter Accident	personal injury/ death,equipment loss,water pollution	mod	certified pilot & mechanic,FAA maintenance & inspections	low
Personal Accidents	difficult access to medical care injury/death	mod-high	use protective equipment,1st aid supplies,experienced/qualified personnel,safety awareness,medivac plan	l-m
Sediment Delivery	spawning habitat effects,turbidity	mod	reservoir drawdown, BMPs,setbacks,filter cloth checkdam	low
Wilderness Attributes	short-term reduc-duction in solitude &naturalness,soil/ vegetation disturbance	low-mod	fire pans,proper human waste disposal,leave no trace talk to all workers camp mgt. plan	low
Cultural/Prehistoric Sites	damage to artifacts on site	mod	archaeologist to id sites&be present during excavation	low

1. Air Operations, Safety, and Materials Handling

A plan for air operations, public safety, and hazardous materials handling will be completed and implemented. This plan will address communications, flight following, flight paths, air hazards, helispot management, public information, emergency medical evacuation, search and rescue, and the transportation and storage of diesel fuel and gasoline.

2. Soils, Watershed, and Aquatic Ecosystems

Best management practices, including Inland Native Fish Strategy (INFISH) and Montana Streamside Management Zone (SMZ) restrictions, will apply and will be implemented to mitigate effects to soil and water. Copies of the INFISH and SMZ regulations are available in the Project File at the Stevensville Ranger District. Best management practices include:

(1) Storing all fuel and conducting all refueling within an INFISH-approved impoundment area located away from water.

(2) Conducting outlet pipe replacement/repair after the water level of the reservoir has been drawn down to its minimum level.

(3) Seeding all disturbed soil areas at the work site with 25 lbs/acre of annual ryegrass (Lolium multiflorum) and 10 lbs/acre of mountain brome (Bromus marginatus).

(4) Installing filter cloth and a temporary filter dam downstream of the outlet to trap sediment coming out of the reservoir.

A fuel storage area at the dam would be necessary to replace/repair the outlet pipe. It would be cost-prohibitive and would involve more risks to fly in or pack in the fuel needed to operate motorized equipment on a daily basis. At the time of the project, the reservoir would be drawn down to its minimum pool elevation, and the fuel storage area would be placed as far from the water's edge as possible (at least 120'). The fuel storage area would be temporary and would be used for a maximum of three weeks. The fuel storage area would consist of an excavated pit completely lined with a heavy plastic liner to prevent any run-off or infiltration in the event of leaks. The fuel storage area would have a Forest Service-approved spill containment plan. Capacity of the fuel storage area would vary by alternative. A maximum of 220 gallons (4 55-gallon barrels) would be stored under Alternatives 2 and 4. Alternative 3 would store 55 gallons or less. Fuel barrels would be placed on pallets to facilitate the detection of leaks. All refueling of equipment would at the lined pit. The fuel storage area will be kept covered with a waterproof tarp. At the completion of work, all rainwater that has collected in the lined storage pit will be pumped into an empty barrel and flown out. The site would be recontoured and revegetated following project completion.

3. Vegetation

All vehicles and equipment used on the project will be thoroughly steam cleaned and inspected for the removal of potential noxious weed seeds prior to using the vehicles and equipment on National Forest land.

Areas used for long-term camping while the project is being completed should be confined to previously disturbed camping areas in order to reduce impacts on native vegetation.

Debris burning piles will be no more than 20 feet in diameter and no more than 6 feet high to minimize the area burned and potential habitat for noxious weeds.

Any areas receiving soil disturbance should be reseeded with the following mixture: 25 lbs/ac of annual ryegrass (Lolium multiflorum) and 10 lbs/ac of mountain brome (Bromus marginatus) for a total of 35 lbs/acre of seed.

4 Wildlife

Helicopter flights will be restricted to south and west of Tin Cup Creek except near the dam site to minimize disturbance to mountain goats.

5. Wilderness, Recreation, and Trails

To ensure public safety, users will be notified of repair operation times by radio announcements, newspaper articles, and trailhead notices. A wilderness ranger will monitor access and repair progress and will keep public information current.

Reconstruction activity will be sensitive to needs for protecting wilderness resource values at the dam site and during ingress and egress. Disturbed areas at the dam site will be seeded, naturalized, and monitored for stabilization and vegetation needs.

Tread or drainage structures on The Tin Cup Creek Trail #96 will be protected. Damaged tread or drainage structures will be restored to the original condition.

An agreement for campsite management will be developed between the Forest Service and the permittee. The intent of this agreement will be to provide for resource protection and the efficient reconstruction of the Tin Cup Dam. Topics addressed include: camp location, period of use, numbers of people, numbers of stock, stock containment, wastewater disposal, garbage disposal, human waste disposal, cooking and water heating, firewood gathering, campfires, camp appearance, protection of ground cover, and food and feed storage.

The wilderness ranger will initiate contact and discussion with workers to ensure understanding and awareness of wilderness ethics and resource protection standards.

6. Cultural Resources

Areas used for long-term camping during project implementation should be confined to previously disturbed camping areas, preferably within the area previously surveyed for cultural resources. If horses are used in the project, the location of any stock confinement and/or picket areas will be determined in consultation with Forest Heritage Program staff in order to avoid adverse impacts to known cultural sites. The location of burn piles will also be determined in consultation with Forest Heritage staff to avoid adverse

impacts to known or potential cultural sites. If cultural resources not identified in initial surveys are encountered during implementation of the project, activities must be halted and the Forest Historian must be notified. Activities could proceed once the significance of the site has been determined and protection and mitigation of impacts are ensured. If mitigation or protection is not possible, activities may not resume.

C. Monitoring Common to All Action Alternatives

Follow-up inspections of the dam, camp site, and corral will provide monitoring of the effectiveness of the repair work for safety and engineering standards, wilderness and recreation objectives, and trail rehabilitation and drainage improvements. These inspections will be completed at least annually and will also monitor the revegetation success on disturbed sites and noxious weed spread.

VI. COMPARISON OF ALTERNATIVES

The comparison of the alternatives is done by using issues or concerns that were identified during the public scoping and by using those identified by the Forest Service. This provides a clear basis for choice among the alternatives for the decision maker and the public. Some issues have been consolidated to facilitate a better understanding of relational effects.

A. Watershed, Soils, and Aquatic Ecosystems

All of the Action Alternatives would introduce minor sedimentation of the lower Tin Cup Lake in the immediate vicinity of the dam and in Tin Cup Creek at the reservoir outlet; as well as for several hundred yards immediately downstream. Favorable conditions of streamflow to maintain beneficial water uses instream and downstream would be maintained with all alternatives. The alternatives vary slightly in minor sedimentation potential from outlet pipe replacement.

The small sediment increase differences between alternatives would be too small to be quantified. Sediment inputs from the dam repair work would be minor, temporary, and largely confined to the upper mile of Tin Cup Creek directly below the dam. Sediment inputs would be short-term, localized, and not of a large enough magnitude to cause detectable changes in stream habitat quality or channel equilibrium.

With all alternatives, dam repair work will not disturb any wetlands.

Alternatives are compared for their potential effects to the watershed and fisheries resource in the following table. Alternative 4 has the least effects to aquatic ecosystems in the short-term, but those effects would simply be postponed for one year when the outlet-pipe replacement occurs.

Table 2.2 Comparison of Effects on Water Quality and Fisheries

EFFECT	ALT 1	ALT 2	ALT 3	ALT 4
Sediment input (stream)	None	Minor	Minor	Minor
Sediment input (lake)	None	Minor	Minor	Minor
Stream flows	No change	No change	No change	No change
Water temperatures	No change	No change	No change	No change
Protects beneficial uses?	Yes	Yes	Yes	Yes
Protects all wetlands?	Yes	Yes	Yes	Yes
Threat of dam failure	Highest	Lowest	Low	Low
Fish habitat loss	None	Local/outlet	Same as 2	Same as 2
WSCT displacement/loss	None	Minor	Minor	Minor
Bull trout displace/loss	None	None	None	None
Retards INFISH RMOs?	No	No	No	No

(WSCT = westslope cutthroat trout; RMOs = Riparian Management Objectives)

B. Wildlife

1. Alternative 1

This alternative would not alter the habitat or change the existing level of human disturbance to any wildlife species in the area, in the short term. However, if the dam were to fail because of lack of action, floodwaters could affect downstream wildlife habitat and populations.

2. Alternative 2

This alternative would not alter existing habitat quality for any wildlife species. It has some potential for minor, temporary impacts to a number of wildlife species due to disturbance associated with helicopter flights and/or dam repair activities. None of these impacts would be expected to affect populations or distribution of any wildlife species.

3. Alternative 3

This alternative would have effects similar to Alternative 2. Potential for disturbance from project activities would be slightly greater because limitations on the use of motorized equipment would increase the duration of those activities near the dam. The reduced noise associated with using hand equipment instead of machinery for some tasks would mitigate the increased duration of disturbance to some extent. Regardless, none of these impacts would be expected to affect populations or the distribution of any wildlife species.

4. Alternative 4

This alternative would have wildlife effects similar to Alternative 2, although project activities and associated disturbance would be spread out over two summers. This would increase the potential for cumulative disturbance to individuals with territories near the dam site, under the helicopter flight path, or near the Tin Cup Trail, but such disturbance is not expected to have adverse effects on any wildlife species.

C. Wilderness, Recreation, and Trails

Table 2.3 Comparison of Alternatives - Wilderness and Recreation

ISSUES	ALTERNATIVES 1 No Action	2 Proposed Action	3 Horses	4 Defer Pipe Replacement to 98
Preserving/Protecting Wilderness Values in Assessment Area	*	Uses Heli and mitigation to reduce effects	Uses more primitive tools but takes longer	Concentrates motorized use in one season (98) if work is needed in 98
Estimated Duration of Effects (days)	*	14	21	5-1997 11-1998**
Effects to Tin Cup Trail #96- Within and Outside of Wilderness	*	low-heli access	more effects due to draft horse use	low-heli access
Effects on Wilderness Recreationists	*	low-heli flights and around dam	same as Alt 2	may be greater than Alts 2 or 3 due to 2 seasons
Use of Minimum Tools	*	yes	yes	yes
Use of Primitive Tools	*	no	yes	no
Future Disturbances to Wilderness	yes	yes	yes	yes

* No probable effect in the short term. However, if the dam should fail because of lack of repairs, it would create major negative effects to wilderness values and to the Tin Cup Trail.

** There may be more than 11 days of work in 1998, depending on what Tin Cup Water Company proposes.

D. Economics, Engineering, and Safety

Estimated Costs by Alternative:

Alternative 1 $0 (does not include dam removal costs)
Alternative 2 $100,000
Alternative 3 $115,000
Alternative 4 $ 25,000-(1997) $80,000-(1998)*

* Does not include costs of other possible 1998 repair work besides the installation of the pipe liner and rip rap testing.

1. Alternative 1

The No Action Alternative would not meet engineering and dam safety requirements. The dam currently needs to be repaired, and the outlet pipe replacement and debris removal is the minimal work that is needed.

2. Alternative 2

The actions as proposed by the Tin Cup Water Company, if completed and accepted by Forest Service engineers, will meet federal dam safety requirements. The estimated cost of this alternative is provided by the Water Company.

3. Alternative 3

The completion of the project with the use of horses and crosscut saws, if approved by Forest Service engineers, will meet federal dam safety requirements. There is a risk that draft horses will not be able to pull the plastic pipe sleeve through the existing masonry and culvert outlet.

The use of draft horses would eliminate the need to fly the backhoe in and out, which is a hazardous operation. The use of draft horses would also reduce the amount of fuel that would need to be flown in and stored at the site, from 200 gallons to approximately 50 gallons. Fuel transport and storage can provide risks from spills.

The backhoe would also not be available with this alternative for assisting with the drilling and soil sampling of the dam core. Alternative methods using portable equipment are available, but they would take more time and the results may not be as complete.

4. Alternative 4

This alternative would meet engineering and safety standards, providing that the patching of the outlet pipe can be completed successfully. There is a risk that the strong water current through the pipe could erode the concrete patches, or that some loose rock or holes that need to be patched are missed. This could create erosive action and damage within the outlet pipe, putting the integrity of the dam at risk.

If other repair work is needed in 1998, this alternative would add to the length of the 1998 operations. This alternative would also lengthen the time needed to drain the lake, because only low volumes and velocities of water should pass over the patched outlet pipe to protect it from erosive action. This could create a constraint on completing all the work in 1998.

CHAPTER 3

Affected Environment

CHAPTER 3

AFFECTED ENVIRONMENT

I. GENERAL DESCRIPTION

The Tin Cup Lake Dam is located near the headwaters of Tin Cup Creek, within the Selway-Bitterroot Wilderness, Bitterroot National Forest (Maps, Chapter 1). The lake stores 2,400 acre feet of irrigation water for the owners, Tin Cup Water Company. The use of national forest land is authorized with a special-use permit.

The drainage basin above the Tin Cup Reservoir contains approximately 4,000 acres. Elevations range from 6,295 at the reservoir to approximately 9,200 feet at the basin divide.

The dam was originally constructed in 1906; it was 300 feet long and 20 feet high. Over the years it has been enlarged to it's current size of 437 feet long and 25 feet high. In 1963, 1964, and 1968 a small dozer was walked to the dam to clean up debris and to place additional fill material and rock armor on the dike crest and upstream face (Tin Cup Water Company, 5/15/92).

The outlet pipe does not meet current engineering and safety standards, and it needs to be replaced to prevent erosion which could affect dam stability.

Further investigations and sampling of the dam is needed to determine the composition of the dam interior. These findings, along with a probable maximum flood analysis, will determine the hazard rating of the dam, which will dictate the storage and discharge capacity of the structure.

II. PHYSICAL ENVIRONMENT

A. Watershed, Soils, and Aquatic Ecosystems

Tin Cup Lake is a reservoir of about 2,420 acre feet of water storage, and the lake area is about 100 acres. Stored waters provide irrigation for agricultural land. Reservoir outlet gates typically are opened from mid-July to late October. Drainage area for the lake is 6.2 square miles, with an average annual watershed precipitation of about 85 inches. The majority of Tin Cup streamflow is from snowmelt runoff, and about half of the annual precipitation is yielded as streamflow and reservoir storage.

Most of the precipitation occurs as snow from October to April. Summer months are characterized by cool, generally dry weather with occasional rainfall and thunderstorms. Freezing temperatures can occur during any month. Snow depths reach 20 feet at higher elevations, with accumulations of 5 to 10 feet being more typical at the dam site. Average annual precipitation at Tin Cup Lake is about 70 inches with up to 100 inches on the upper mountain ridges of the watershed.

The Tin Cup Creek watershed is primarily formed of granitic type rocks whi were glacially carved about 10,000 years ago. Tin Cup Creek canyon is a

fifteen mile long glaciated trough or "U" shaped canyon. Elevations range from 8,000 to over 9,000 feet along the mountain tops and ridges to about 4,000 feet at the canyon mouth. Elevation at Tin Cup Lake is 6,295 feet.

The stream supports several species of trout. Channel conditions are stable; the morphology being controlled by relatively low sediment loads from the glaciated granitic rocks of the watershed. Water yields range from peaks during May and June snowmelt to low baseflows in late summer and fall, which are in large part sustained by the slow release of stored soil moisture, especially from deposits of wind blown volcanic ash in the high basin valleys.

Water quality in Tin Cup Creek on the National Forest fully supports all beneficial uses such as supporting aquatic life and downstream irrigation. Montana Department of Environmental Quality lists Tin Cup Creek downstream of the Forest boundary as water quality impaired for cold water fisheries due to irrigated agriculture causing dewatering and siltation.

The majority of the stream channel is moderately entrenched and confined in valley bottoms ranging from a few hundred feet wide to about 500 feet wide. Channel gradient is usually moderate in the valley bottom, ranging from 2 to 4 percent, and steep in the headwaters tributaries. Dominant channel substrates range from boulders to cobbles to gravels, classified as Rosgen stream types of B2, B3, and B4 respectively. Tributaries to Tin Cup Lake are steep boulder and bedrock controlled channels of A1 and A2 Rosgen stream types. Stream sensitivity to disturbance ranges from very low on A1, A2, B1, and B2 type channels, low on B3 type, and moderate on B4 types. The smaller substrates are more easily disturbed.

The Tin Cup Creek Trail is stable with erosion control and drainage adequate to protect stream water quality. Trail stream crossings at fords are stable due to large size cobble and boulder channel substrates and stable stream banks.

B. Wetlands

Wetland classification was made using U.S. Fish and Wildlife Service's (FWS) Cowardin, Carter, Golet, and LaRoe, "Classification Wetlands and Deepwater Habitats of the United States," FWS/OBS-79/31, December, 1979. Wetlands are areas having: 1) vegetation growing in water or wet soils; 2) soils that are saturated in the upper layers; and 3) high water tables in the soil, according to the 1989 "Federal Manual for Identifying and Delineating Jurisdictional Wetlands". The Army Corps of Engineers administers a permit system for activities affecting wetlands; thus, the term jurisdictional. Riparian areas include wetlands and transition areas to drier upland soils and vegetation.

Tin Cup Lake FWS wetland and deepwater class is lacustrine, littoral-limnetic, unconsolidated bottom, cobble-gravel. Tin Cup Creek FWS class is riverine, perennial, unconsolidated bottom, cobble-gravel. Soils of the Tin Cup Creek wetlands and valley bottom are sandy loam on the surface, and sandy gravels and cobbles below the surface. Most of Tin Cup Creek wetlands have two FWS classes: 1) palustrine, forested, needle-leaved evergreen, Engelmann spruce on terrace landforms, which are tens to hundreds of feet wide; and 2) palustrine, scrub-shrub, broad-leaved deciduous, willow-alder on floodplain landforms which are tens of feet wide. Tin Cup Creek watershed has many glaciated cirque basin

wet meadows and avalanche paths with wetland meadows. Tin Cup Creek wetlands function as wildlife and fish habitat, input organic matter to streamflow, store water and sediment, and are aesthetically and recreationally valuable.

III. BIOLOGICAL ENVIRONMENT

A. Fisheries

1. Area of Analysis

The analysis area encompasses the entire Tin Cup Creek drainage from Tin Cup Reservoir downstream to the Bitterroot National Forest (BNF) boundary (12.5 stream miles). Fish-bearing streams include: (1) all of Tin Cup Creek; and (2) an unnamed fork of Tin Cup Creek which drains Kerlee Lake (referred to as "North Tin Cup Creek" T. 3 N., R. 22 W., Secs. 29 & 32). Numerous small, unnamed perennial and intermittent tributaries drain the sides of the Tin Cup canyon; however, none support fish populations. The Tin Cup drainage is not located within an Inland Native Fish Strategy (INFISH) Priority Watershed.

2. Management Standards

a. Forest Plan

Management standards for riparian areas and fisheries habitat are contained in the Forest Plan (pages II-3, II-5, II-14, III-22 to III-29) and the INFISH Environmental Assessment (EA). The Forest Plan was amended on August 30, 1995, with the signing of the INFISH EA. INFISH establishes Riparian Management Objectives (RMOs) for all Riparian Habitat Conservation Areas (RHCAs) across the forest. RHCAs are portions of watersheds where riparian-dependent resources receive primary emphasis. A map displaying RHCAs in the analysis area is available in the Project File.

b. Threatened, Endangered, and Sensitive Fish Species

There are currently no Threatened or Endangered fish species in the analysis area. The bull trout (Salvelinus confluentus) is presently designated as a Category 1 (C1) species by the FWS, meaning that "listing as Endangered or Threatened is warranted, but has been precluded". An updated ruling on the status of bull trout is expected by late 1997. Three fish species are listed as Sensitive in the analysis area: bull trout; westslope cutthroat trout (Oncorhynchus clarki lewisi); and shorthead sculpin (Cottus confusus). Bull trout and westslope cutthroat trout are present in Tin Cup Creek. The shorthead sculpin was added to the BNF Sensitive Species List in 1994 based on the possibility that its distribution might include the Bitterroot River drainage. This species has not been found in the Bitterroot drainage in any collections to date. Genetic testing of sculpins captured from Bitterroot River tributaries in 1993 and 1994 did not identify any individuals of this species.

3. Reference Conditions

There are only two native trout species in the Bitterroot River drainage: bull trout and westslope cutthroat trout (WSCT). A discussion of reference fish populations and habitat conditions in contained in the Project File.

4. Existing Conditions

a. Fish Populations

In general, Tin Cup Creek is dominated by native WSCT and bull trout above the wilderness boundary and non-native trout (brook trout - Salvelinus fontinalis; brown trout - Salmo trutta; and rainbow trout - Oncorhynchus mykiss) below the wilderness boundary and on private land. Specifically, Tin Cup Creek supports five distinct fish communities roughly contained within the following sections:

Section #1 = Bitterroot River to BNF boundary (3.4 stream miles);
Section #2 = BNF boundary to Wilderness boundary (4.1 stream miles);
Section #3 = Wilderness boundary to one mile above the first stream crossing of trail #96 (2.1 stream miles);
Section #4 = One mile above the first stream crossing to North Tin Cup Creek (4.4 stream miles); and
Section #5 = North Tin Cup Creek to the headwaters, including Tin Cup Reservoir (> 5.0 stream miles).

Species composition and relative abundance in these sections is summarized in Table III-1. Data was obtained using a combination of daytime snorkel surveys, presence/absence electrofishing, and mark/recapture population estimates. A map displaying fish species distribution is available in the Project File.

Table 3.1 Fish Distribution and Relative Abundance in Tin Cup Creek

SPECIES	WS	BT	EB	BB	LL	RB	MW	SS	SU
SECTION 1	U *	-	A *	-	C *	C *	U *	C **	U *
SECTION 2	C *	R **	A *	U	U *	U *	-	C **	-
SECTION 3	A *	U *	C *	U	R *	R *	-	C **	-
SECTION 4	A *	U *	-	-	-	-	-	C **	
SECTION 5	C *	-	-	-	-	-	-	-	

Species codes: WS = Westslope cutthroat trout; BT = Bull trout; EB = Brook trout; BB = Bull trout/Brook trout hybrids; LL = Brown trout; RB = Rainbow trout; MW = Mountain whitefish (Prosopium williamsoni); SS = Slimy sculpin (Cottus cognatus); SU = Sucker spp. (Catostomus spp.)

Abundance codes: - = Absent; R = Rare; U = Uncommon; C = Common; A = Abundant

Spawning codes: * = spawning population, young-of-the-year (YOY) fish detected during surveys; ** = probably a spawning population, but YOY were not detected during surveys; Bull trout/Brook trout hybrids are generally sterile.

Tin Cup Creek contains a series of geologic fish barriers (waterfalls/bedrock chutes) near the North Tin Cup confluence. These barriers block upstream fish movement, but probably do not prevent fish from being washed downstream over the barriers. Tin Cup Dam is also a barrier to upstream fish movement. It is unknown whether Tin Cup Creek historically contained fish between the barriers and Tin Cup Reservoir. Presently, hybridized WSCT (with Yellowstone cutthroat trout/YCT, Oncorhynchus clarki bouvieri) are common between North Tin Cup Creek and the dam outlet, and they spawn throughout the section. These WSCT are possibly the progeny of WSCT and YCT originally stocked in Tin Cup Reservoir that have washed out of the reservoir over the years (through the outlet pipe or over the spillway) and colonized previously fishless sections of upper Tin Cup Creek. Bull trout are probably absent between the barriers and Tin Cup Reservoir, but their absence has not been confirmed by surveys.

Tin Cup Reservoir is a 90-acre impoundment with maximum depths greater than 100'. According to Montana Department of Fish, Wildlife, and Parks (FWP) stocking records, Tin Cup Reservoir has only been stocked once (10,000 rainbow trout fry in 1942). Undocumented plants of rainbow trout and/or cutthroat trout could have also occurred between 1940 and 1970. In the past, FWP did not distinguish between the two sub-species of cutthroat trout, propagating them together in hatcheries as "cutthroat" trout. Therefore, any cutthroat trout planted in Tin Cup Reservoir prior to 1970 would likely have consisted of a mixed genetic stock of YCT and WSCT. This hatchery stock of cutthroat trout originated from a wild strain of lake-dwelling YCT domesticated in the early 1900's. Stocked WSCT and YCT washing out of the reservoir over the years may explain the origin of the hybrid WSCT present above barriers in Tin Cup Creek.

Genetic testing of WSCT from Tin Cup Creek has determined that populations are hybridized with YCT (throughout the entire drainage) and rainbow trout (below

the wilderness boundary). Presently, Tin Cup Reservoir supports an abundant, naturally-reproducing population of hybrid WSCT. Suitable spawning habitat is available for these lake-dwelling WSCT in the Tin Cup Creek inlet, upstream of the reservoir. FWP currently manages Tin Cup Reservoir for wild trout, meaning that existing populations are reproducing naturally and the reservoir is not scheduled for any future introductions of hatchery-reared trout.

Bull trout populations in Tin Cup Creek probably consist entirely of resident life history fish (adult fish < 15" in length that spend their entire life in their natal stream). A few larger spawning adults (15-20") are also present, but these fish are probably large residents, and not migratory spawners from the Bitterroot River. Because Tin Cup Creek is significantly dewatered on private land during the irrigation season, it is unlikely that spawning bull trout from the Bitterroot River could access BNF sections of Tin Cup Creek during the September-October spawning period. Although YOY bull trout were not observed during surveys, juvenile (< 4" in length) bull trout were observed between the trailhead and North Tin Cup confluence, indicating at least some bull trout spawning activity in this section. Bull trout/brook trout hybrids are present at low densities between the trailhead and wilderness boundary, indicating that hybridization is occurring where the two species' distributions overlap. A discussion of reference conditions and the viability of bull trout and WSCT populations in Tin Cup Creek is contained in the Project File.

b. INFISH Riparian Management Objectives

Four INFISH RMOs apply to Tin Cup Creek: (1) pool frequency; (2) large woody debris (LWD) frequency; (3) mean-maximum water temperature; and (4) width-depth ratio. At present, the BNF is using the default RMO values outlined in the INFISH EA. A copy of the default RMOs in contained in the Project File. There is no RMO for sediment in the INFISH EA; however, a forest-specific sediment RMO may be developed in the future based on stream survey data. A discussion of existing sediment conditions is included in this section. RMOs were determined by surveying 5 miles of Tin Cup Creek between the trailhead and dam outlet. Consult Table 3.2 for a summary of INFISH RMOs and existing sediment conditions.

Pool Frequency: Pool frequency refers to the number of pools occurring in a given length of stream. Pools are the key RMO in the INFISH strategy, and probably the most important physical habitat component in streams. Pools are the habitats where trout spend most of their lives. Generally, the larger, deeper, more complex the pool, the greater its value to fish. The RMO standard for pool frequency varies by wetted width of the stream channel.

Tin Cup Creek currently meets the RMO for pool frequency

LWD Frequency: LWD frequency refers to the number of LWD pieces occurring in a given length of stream. LWD is a critical component of good fish habitat. LWD forms pools, provides cover, stabilizes stream channels, protects banks from scouring, traps sediment and organic material, and provides food and habitat for aquatic insects. LWD is abundant in Tin Cup Creek. The RMO standard for LWD frequency is > 20 pieces per mile (> 12" diameter, > 35' length).

Tin Cup Creek currently meets the RMO for LWD frequency

Mean-Maximum Water Temperature: Mean-maximum water temperature refers to the mean of the maximum water temperatures recorded over the warmest 7-day period of the year. The RMO standard is mean-maximum water temperatures < 15 C (59 F) within adult holding habitat and < 10 C (48 F) within spawning and rearing habitat. Tin Cup Creek contains both adult holding and spawning/rearing habitat. Therefore, the 15 C threshold was used for this analysis.

Tin Cup Creek currently meets the RMO for mean-maximum water temperature during average and colder-than-average summers, but does not meet the RMO during warmer-than-average summers. Temperatures in Tin Cup Creek were continuously monitored at the canyon mouth over three summers; 1993 (a "cold" summer); 1994 (a "warm" summer), and 1996 (an "average" summer). RMO standards were met during summers 1993 and 1996, but not during summer 1994. In summer 1994, maximum water temperatures exceeded 15 C (range 15-18 C) for more than 46 days. During summers 1993 and 1996, temperatures exceeded 15 C for 2 days and 7 days, respectively. Preliminary examination of the effect of stored water releases from Tin Cup Reservoir indicates that water releases probably cause slightly colder temperatures from mid-July through late August (the warmest part of the year), and no noticeable change in autumn when stream temperatures are in rapid decline. The Tin Cup drainage is so large that the effects of water releases appear to be detectable only within a couple of miles of the dam. At the canyon mouth, effects of stored water on the stream's water temperature regime are difficult to detect. Tin Cup Creek contains sufficient riparian canopy cover to maintain stable summer and winter temperatures within natural ranges.

Width-Depth Ratio: The width-to-depth ratio is the relationship of a stream's mean wetted width to its mean depth. Streams that have been impacted by management activities generally respond by becoming wider and shallower over time (resulting in higher width-depth ratios). Narrow, deeper channels (lower width-depth ratios) typically provide much better trout habitat. The RMO standard for width-depth ratio is a ratio < 10 (mean wetted width/mean depth).

Tin Cup Creek does not currently meet the RMO for width-depth ratio. However, the ratio observed (33.2) is consistent with those measured in large, unmanaged watersheds throughout FS Region 1 and Region 4 (Overton et. al, 1995). Habitat survey data collected from numerous BNF stream reaches indicates that the desired RMO standard for width-depth ratio is probably not a reliable indicator of stream channel health on this forest. This RMO is in the process of being modified using forest-specific data to better reflect the characteristics of healthy stream channels. The width-depth ratio observed in Tin Cup Creek appears to be a natural feature of the stream.

Fine sediment levels throughout Tin Cup Creek are low (< 10%) and probably near reference conditions with one notable exception, the first mile of stream below the dam outlet. This section of Tin Cup Creek contains a mix of low gradient depositional habitats and high gradient cascades. In this section, sediment deposition in the low gradient riffles and pools is probably higher than reference conditions (range 27-36%), particularly within the first 300' of stream below the dam outlet.

Stream flows in Tin Cup Creek vary according to season, and are affected by the operation of Tin Cup Dam. When stored water is initially released from Tin Cup Reservoir (usually around mid-July), summer flows are higher than normal for most of July and early August. In late autumn and winter (November-March), the

gate on the dam is closed for water storage, and winter flows are lower than normal. In spring (April-June), the gate on the dam is still closed for water storage, but snowmelt and rainfall provide near normal flows. Overall, low winter flows and the resulting loss of overwintering/rearing habitat may be the most significant impact of Tin Cup Dam on downstream fish populations.

Table 3.2 Status of INFISH RMOs and Existing Sediment Levels

RMO	DESIRED RMO STANDARD	OBSERVED VALUE
Pool Frequency	26-47 pools/mile	34 pools/mile
LWD Frequency	> 20 pieces/mile	118 pieces/mile *
Mean-Max Water Temp	< 15 C	< 15 C (average summer) * < 15 C (cold summer) * > 15 C (warm summer)
Width-Depth Ratio	Ratio < 10	33.2
% Fines (riffles)	No standard	< 10% (lower Tin Cup) 27-36% (below dam outlet)
% Fines (tailouts)	No standard	27-36% (below dam outlet)

INFISH RMOs meeting desired standards are denoted with an asterisk (*); % surface fines were measured with Wolman Pebble Counts in low gradient riffles and scour pool tailouts.

B. Vegetation (including noxious weeds and sensitive plants)

1. Area of Analysis

Areas of proposed ground-disturbing activities, including the spillway, dam proper, and potential borrow site areas adjacent to the dam, were inventoried for native, exotic, and sensitive plant species.

2. Threatened, Endangered and Sensitive Plants

The Endangered Species Act (1973) requires the Forest Service to conserve endangered and threatened species. The National Forest Management Act (1976) and Forest Service policy direct that National Forest System lands be managed to maintain populations of all existing native plant and animal species at or above minimum population levels. Plant species for which population viability is a concern are identified by the Forest Service as sensitive species. A viable population consists of the number of individual plants adequately distributed throughout their range necessary to perpetuate the existence of the species in natural, genetically stable, self-sustaining

populations. Forest Service policy requires that activities conducted on National Forests be reviewed for possible impacts on endangered, threatened or sensitive species (Bitterroot National Forest, 1992).

There is one federally listed threatened plant species in the state of Montana. Water Howellia (Howellia aquatilis) was listed by the U.S. Fish and Wildlife Service in July of 1994. This species is not known to occur on the Bitterroot National Forest. The Northern Region Sensitive Plant Species List (USDA Forest Service, 1994) identifies a number of sensitive species for each National Forest for which population viability is a concern. This list includes 33 plant species on the Bitterroot National Forest.

An evaluation of this list for the Tin Cup Dam project was conducted by reviewing the Montana Natural Heritage Program (MTNHP) database for known locations of sensitive plants within the area. The area was also assessed for inclusion of potentially suitable habitat for other sensitive plant species by air photo interpretation and discussion with project leaders. The following list of species was drafted based on the above assessment:

tall swamp onion	Allium validum
candystick	Allotropa virgata
sandweed	Athysanus pusillus
Rocky Mountain paintbrush	Castilleja covilleana
small yellow lady's-slipper	Cypripedium calceolus var parviflorum
Idaho douglasia	Douglasia idahoensis
Evermann's fleabane	Erigeron evermannii
western boneset	Eupatorium occidentale
hiker's gentian	Gentianopsis simplex
discoid goldenweed	Haplopappus macronema var macronema
Bitterroot bladderpod	Lesquerella humilis
primrose monkey-flower	Mimulus primuloides
storm saxifrage	Saxifraga tempestiva
California false hellebore	Veratrum californicum

3. Survey Results

A field survey for native, exotic, and sensitive plant species was conducted in the analysis area in August, 1992. The dam spillway was found to be mostly unvegetated, consisting of boulders from the original streambed. Along the edges of the spillway vegetation consisted of subalpine spiraea (Spiraea densiflora), blue huckleberry (Vaccinium globulare), Sitka alder (Alnus sinuata), and lodgepole pine (Pinus contorta) seedlings. Suitable habitat for the following sensitive plant species was not found to occur within the spillway area: sandweed occurs on vernally moist rocky areas; primrose monkey-flower occurs in sphagnum bogs; and western boneset, storm saxifrage, discoid goldenweed, Rocky Mountain paintbrush, Bitterroot bladderpod, and Evermann's fleabane all occur in open, rocky areas, associated with shallow soils. The area and adjacent riparian areas were also checked for hiker's gentian, small yellow lady's-slipper, tall swamp onion, and California false hellebore. None of these species were found in the vicinity of the lake or in adjacent riparian areas.

Growing on the dam itself is a variety of exotic and native plant species, including red raspberry (Rubus idaeus), Engelmann spruce (Picea engelmannii) seedlings, pearly everlasting (Anaphalis margaritacea), fireweed (Epilobium angustifolium), thimbleberry (Rubus parviflorus), yarrow (Achillea millefolium), and the exotic species, spotted knapweed (Centaurea maculosa) and white clover (Trifolium repens)

The potential borrow pit area was previously disturbed and has a small seep running through it. Vegetation in the drier area consists of subalpine fir (Abies lasiocarpa) saplings, leafy aster (Aster foliaceus), pearly everlasting, mountain arnica (Arnica latifolia), umber pussy-toes (Antennaria umbrinella), common red paintbrush (Castilleja miniata) and the exotic species, red clover (Trifolium pratense). In the seepy area vegetation consists of Merten's sedge (Carex mertensii), slender bog orchid (Habenaria saccata), arrowleaf groundsel (Senecio triangularis), mountain boykinia (Boykinia major), ladyfern (Athyrium felix-femina), horsetail (Equisetum sp.), and Sitka alder.

The forest edges were searched for candystick and Idaho douglasia. Candsystick usually occurs in late seral, open lodgepole pine stands in the subalpine fir/beargrass (Abies lasiocarpa/Xerophyllum tenax) habitat type. Idaho douglasia has been found in open, gravelly sites and is often associated with subalpine fir, whitebark pine (Pinus albicaulus), and beargrass. It is known to occur in Idaho and is suspected to occur only in the Idaho portion of the Bitterroot National Forest. Forested areas near the dam were too moist for these 2 species.

4. Desired Future Condition

The desired future condition for sensitive plants is to ensure that management of lands, water, biota, and people provide environmental conditions and trends that contribute to long-term viability of these as well as all native species.

C. Wildlife - Overview of Species and Habitat

The analysis area used for evaluation of effects to wildlife species is the entire Tin Cup Creek drainage west of the mouth of Tin Cup canyon. This drainage provides habitat for wildlife species typically found in coniferous forests of western Montana. Elk, mule deer, and white-tailed deer are resident in the area. Moose occur primarily in or near the creek bottom and adjacent thickly vegetated north aspects. Mountain goat winter and summer range is found along the steep south-facing cliffs above Tin Cup Creek and Tin Cup Lake, respectively. Other resident species of interest include black bear, mountain lion, coyote, furbearers, and numerous birds and small mammals.

Wildlife habitat in the drainage includes riparian vegetation along Tin Cup Creek, large grassy or rocky openings with scattered trees on many of the south facing slopes, and extensive areas of montane forest dominated by lodgepole pine, Douglas-fir, and sub-alpine fir on the north aspects. With increased elevation, the forest transitions into whitebark pine. In addition to streamside riparian zones, portions of the drainages contain seeps and wallows which provide riparian vegetation associated with high water table areas. These wet areas are extremely important as microsites providing habitat for small mammals and birds as well as big game species.

There is little known about pre-settlement wildlife population numbers or distribution for this area. Old trapping records and historic journals provide some presence/absence information. Providing diverse habitats that represent naturally functioning ecosystems will maintain the complex of species that would occur in those systems.

Wildlife species and habitat evaluated in this analysis include: Forest Plan Management Indicator Species (elk, pine marten and pileated woodpecker); Threatened, Endangered and Sensitive species listed for the Bitterroot National Forest (grizzly bear, gray wolf, peregrine falcon, bald eagle, boreal owl, flammulated owl, black-backed woodpecker, common loon, harlequin duck, lynx, fisher, wolverine, Townsend's big-eared bat, northern bog lemming, and Coeur d'Alene salamander); and species of special interest or with unique or limited habitat in the assessment area (mountain goat).

1. Elk - Management Indicator for Early Seral and Edge Species

Existing Condition

Elk summer in the upper elevation cirque basins in Tin Cup Creek and in the adjacent White Cap drainage over the Bitterroot Divide in Idaho. These elk tend to avoid areas where human use is concentrated, such as around Tin Cup Lake. Elk from these drainages winter at lower elevations on the east face of the Bitterroot Mountains, generally in the Spoon-McCoy area or in the Lick Creek area. Numbers of elk wintering in these areas have generally increased over the past ten years, as they have throughout the Bitterroot drainage.

Forest Plan Compliance

The Tin Cup Dam Reconstruction project does not include any timber management activities. Therefore, there is no Forest Plan direction to analyze elk habitat classifications in the Bass Creek drainage. No changes to existing elk habitat ratios are anticipated as a result of this project.

The Tin Cup Creek drainage, which contains the project area, is essentially unroaded except for a road accessing private property just above the canyon mouth. An analysis of Elk Habitat Effectiveness (EHE) based on open road densities in this area was completed in the Fern Creek EA (USFS, 1996). The existing EHE is in compliance with Forest Plan standards. Since no new road construction will occur, no additional analysis of EHE is necessary.

2. Wildlife - Management Indicator Species

The Forest Plan provides direction regarding two Management Indicator Species (MIS), pine marten and pileated woodpecker and their old-growth habitat requirements:

The amount and distribution of old-growth will be used to ensure sufficient habitat for the maintenance of viable populations of existing native and desirable non-native vertebrate species, including two indicator species, the pine marten and pileated woodpecker (Forest Plan, pg. II-19).

Sensitive species suspected to occur within the analysis area were considered for designation as MIS species for this analysis, but the two Forest Plan MIS seemed to adequately represent the habitat needs of these sensitive species. Flammulated owls and pileated woodpeckers prefer similar habitats (mature to overmature ponderosa pine/Douglas-fir forests which contain snags suitable for nesting). Fisher, lynx, and boreal owls all prefer habitats similar to those preferred by marten (mid-to-upper elevation, mature to overmature forest with relatively closed canopies and abundant snags and down woody material).

There are some differences in habitat requirements between these species, and others (black-backed woodpeckers) have rather unique habitat needs. For this reason, existing habitat conditions and expected effects of the alternatives were analyzed separately for each sensitive species. Each sensitive species is thus in effect an MIS.

a. Pine Marten (Martes americana)

Existing Condition

Pine marten are a Forest Plan Management Indicator Species (MIS) for those wildlife species that are associated with upper elevation mature and overmature forest, including small mammals which require down and dead woody cover. Upper elevation forests in the Tin Cup Creek area are typically composed of lodgepole pine, sub-alpine fir, and Englemann spruce.

Optimum habitat for pine marten includes forests with crown closures greater than 50%, where spruce and true firs exceed 40% of the total stand composition. At least 20% of the forest floor should be littered with downfall greater than 3 inches in diameter. Home range sizes for marten vary based on habitat quality and food availability, but in Montana they average approximately 600 acres for males and 250 acres for females (Allen, 1984). To provide sufficient habitat in scarce food years, this area may expand to as much as 1,920 acres of suitable habitat in the northern Rocky Mountains.

Good pine marten habitat in the Tin Cup Creek drainage occurs mostly in the creek bottom area and on the lower north aspects above the creek bottom. Recent research conducted in the Bitterroot Mountains on the Stevensville Ranger District seems to indicate that marten are relatively common in most of the large creek bottoms in this area (K. Foresman, pers. comm., 1997).

Forest Plan Compliance

There is no need to analyze and calculate Habitat Suitability Indices for marten in this analysis since there is no vegetative manipulation contemplated which would alter the existing condition.

b. Pileated Woodpecker (Dryocopus pileatus)

Existing Condition

The pileated woodpecker is a Forest Plan MIS for those wildlife species that are associated with lower elevation mature and overmature forest, including the primary and secondary cavity nesters which require snags and down woody material as a nesting and foraging component of their habitat. Lower elevat

forests in the Tin Cup Creek area are typically composed of ponderosa pine and Douglas-fir, with some black cottonwood mixed along the creek. Optimum habitat for pileated woodpeckers includes extensive areas which contain large numbers of trees and snags that exceed 20" Diameter at Breast Height (DBH), including some snags which exceed 30" DBH. Ponderosa pine, western larch, and black cottonwood are the preferred species for nesting. Numerous stumps and abundant down woody material are also important as foraging habitat. Areas above 6,500 feet are considered non-habitat on the Bitterroot National Forest, although sporadic foraging use does occur in some stands above this elevation.

Studies indicate that it would take approximately 300 acres of optimum habitat to support one pair of pileated woodpeckers. Habitat quality on the Bitterroot National Forest is generally less than optimum due both to the limited productivity of much of the area and to previous management activities. An average of approximately 500-1,000 acres of lower quality habitat is required to support one nesting pair of pileated woodpeckers. Of this, 100 acres of optimal habitat should be available for nesting. Feeding habitat must also be available within the 1,000 acre home range surrounding the nesting core (Warren, 1990).

Pileated woodpecker transects completed annually for the past several years as part of the Forest Plan monitoring effort show highly variable results which do not seem to indicate any particular Forest-wide population trend (Forest Plan Monitoring and Evaluation Report, FY 1995). The closest of these transects to the project area is along the Lake Como trail.

Forest Plan Compliance

There is no need to analyze and calculate Habitat Suitability Indices for pileated woodpeckers in this analysis since there is no vegetative manipulation contemplated which would alter the existing condition.

3. Wildlife - Threatened, Endangered and Sensitive Species

The Forest Plan provides the following direction regarding Threatened, Endangered and Sensitive species:

-The habitat needs of sensitive species, as listed by the Regional Forester will be considered in all project planning (Forest Plan, pg. II-21).

-No formal recovery plan has been established for threatened and endangered species on the Bitterroot Forest. Specific population objectives will be established when sufficient biological information is available to do so. Cooperate and involve the public in any interagency effort (Forest Plan, pg. II-21).

-Participate in the identification and protection of threatened and endangered species and vascular plants identified as rare, pending study and proposal as threatened and endangered (Forest Plan, pg. II-21).

a. Sensitive Species

Sensitive wildlife species are those animal species identified by the Regional Forester for which population viability is a concern, as evidenced by:

-Significant current or predicted downward trends in population numbers or density.

-Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Management goals for sensitive species are to maintain viable populations of a species throughout its existing range within the planning area (FSM 2670.5 19, 28). The planning area is the Bitterroot National Forest, not the project area. Special management emphasis is provided to ensure sensitive species viability and preclude trends toward endangerment that would result in the need for Federal listing as Threatened or Endangered under the Endangered Species Act of 1973. A biological evaluation must be conducted to determine the effects of proposed actions on sensitive species.

Table 3.3 lists the sensitive wildlife species on the Regional Forester's Sensitive Species List that are known or suspected to occur on the BNF, a brief description of suitable habitat, whether the habitat occurs in the project area, and the probability of occurrence of the species based on surveys and/or the presence of suitable habitat. More detailed habitat descriptions and recent sighting information can be found in the Project File. The Biological Evaluation for the Tin Cup Dam EA located in Chapter IV will document expected effects of the alternatives to these sensitive wildlife species.

Table 3.3 Sensitive Wildlife Species

Species	Habitat Description	Habitat in Project Area?	Spp. Present in Project Area?
Black-backed Woodpecker	Recent burns or other areas with lots of recent snags	No	Unlikely
Boreal Owl	OG mixed conifer forests	Yes	Probable
Common Loon	Large lakes below 5,000'	No	Unlikely
CDA Salamander	Springs, seeps, spray zones	Yes	Unlikely (Range Limitations)
Fisher	Mesic forested habitats	Yes	Probable
Flammulated Owl	OG PP, DF	Limited	Possible
Harlequin Duck	High-gradient streams	Yes	Possible
Lynx	Sapling/OG mosaic	Yes	Possible
Northern Bog Lemming	True bogs, wet alpine and sub-alpine meadows	Yes	Possible
Wolverine	Far ranging omnivorous habitat generalist	Yes	Probable transient
W. Big-eared Bat	Caves, mines	No	Unlikely

Surveys for Flammulated Owls were completed on the Tin Cup Road near the mouth of Tin Cup Canyon in 1994, but no owls were detected. No surveys for any of the other sensitive species have been conducted within the analysis area. MDFWP records show that a fisher was trapped in the Tin Cup drainage in 1987.

b. Threatened and Endangered Species

The U.S. Fish & Wildlife Service lists peregrine falcon, bald eagle, gray wolf, and grizzly bear as Threatened and Endangered wildlife species which could occur on the Bitterroot National Forest. Table 3.4 lists these species, a brief description of suitable habitat, whether the habitat occurs in the project area, and the probable status of the species in the project area based on surveys and/or the presence of suitable habitat. More detailed habitat descriptions and recent sighting information can be found in the Project File. The Biological Assessment for the Tin Cup Dam EA located in Chapter IV will document expected effects of the alternatives to these Threatened and Endangered wildlife species.

Table 3.4 Threatened and Endangered Wildlife Species

Species	Habitat Description	Habitat in Project Area?	Species Present in Project Area?
Bald Eagle	Large rivers and lakes	Marginal	Possible migrant
Gray Wolf	Far ranging carnivorous habitat generalist	Yes	Possible transient
Grizzly Bear	Far ranging omnivorous habitat generalist	Yes	No (extirpated from Bitterroot Mtns.)
Peregrine Falcon	Nests on cliffs near open country or water	Yes	Possible breeding

1) Bald Eagle (Haliaeetus leucocephalus) Status Threatened

The Bitterroot Valley provides winter and spring/fall habitat for a small population (average 30 individuals) of bald eagles. Most of these birds usually arrive in the valley in November and leave the area in February and March for northern breeding grounds. Winter bald eagle use seems to be restricted to the Bitterroot Valley and is concentrated along the river corridor. Migrating birds are sometimes seen soaring over BNF land during the spring and fall, and some may use the larger lakes such as Lake Como for foraging at this time. The only known active nest site in the Bitterroot Valley is at the Lee Metcalf Wildlife Refuge. The Tin Cup drainage does not provide suitable nesting habitat for Bald Eagles.

2) Gray Wolf (Canis lupus irremotus) - Status Endangered

Wolves are habitat generalists whose distribution within occupied range is determined mostly by the availability of ungulate prey and isolation from human disturbance (Reel et al., 1989). Upper reaches of Tin Cup Creek support good numbers of deer and elk, and it is likely that individual wolves may use the area on a transitory basis. Wolves were reintroduced in several locations in or near the Frank Church Wilderness in January 1995 and 1996, and radio collared individuals have occasionally traversed the Bitterroot Range since then. Wolf tracks were confirmed on the Tin Cup Trail in 1992, but there have been no reports which indicate the presence of pack activity or territorial animals in this area.

The Final EIS for The Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho (USFWS, 1994) included the entire Bitterroot National Forest within the Central Idaho Nonessential Experimental Population Area (CINEPA). A non-essential experimental population is defined as an introduced population not essential to survival of the species in the wild. The only restrictions on land management activities within the CINEPA would "control intrusive human disturbances around active wolf den sites. Such temporary restrictions on human access, when five or more breeding pairs are established

in an experimental area, may be required between April 1 and June 30, within 1 mile of active wolf dens or rendezvous sites and would only apply to public lands..." (Federal Register 11/22/94, p. 60280).

Possible dispersal routes for future populations of wolves in the Selway-Bitterroot Wilderness might include the Bitterroot Divide along the Montana/Idaho border which forms the western boundary of the Tin Cup Creek drainage. This route could eventually connect future Selway-Bitterroot Wilderness wolf populations with other populations to the north in Montana, as well as to the south in the Greater Yellowstone Ecosystem.

3) Grizzly Bear (Ursus arctos) - Status Threatened

Grizzlies are wide ranging habitat generalists that require isolation from humans and a wide variety of food availability and distribution (Reel et al., 1989). Historical records indicate that grizzly bears were once abundant in the Bitterroot Mountains, but they did not survive the intense pressure from human activity. The last grizzly killed in the area was in 1956. Since that time, periodic sightings of grizzly bears have been reported in the Bitterroots, but none have been confirmed.

Although grizzly bears have not been confirmed as occurring in the Selway-Bitterroot in recent years, the Bitterroot Grizzly Bear Evaluation Area was studied to determine its habitat capability for grizzly bear. This evaluation area was determined to be suitable for grizzly bear and was designated as the Selway-Bitterroot Grizzly Bear Recovery Area, which is one of six ecosystems in the continental U.S. outside of Alaska which are managed for grizzly bear. The Recovery Area lies primarily within the wilderness boundary. Decisions on recovery efforts in this area have yet to be finalized. If grizzlies return to the Selway-Bitterroot, it is possible that some individuals may eventually use the Tin Cup Creek area to some extent.

4) Peregrine Falcon (Falco peregrinus anatum) Status Endangered

Habitat surveys for the Bitterroot National Forest identified suitable nesting sites along the west side of the valley on numerous cliffs in or adjacent to the Selway-Bitterroot Wilderness. Peregrine falcons were reintroduced to the Bitterroot Mountains through a series of releases of captive-bred birds between 1989 and 1993. There are now several known or suspected peregrine breeding territories established in the Bitterroot Mountains west and south of Hamilton. Suitable nesting habitat exists in Tin Cup and adjacent drainages, but there have been no reports indicating the presence of an occupied territory in this area.

4. Other Wildlife Species

a. Mountain Goat (Oreamnos americanus)

Good mountain goat habitat is widespread along the steep, rocky canyon walls in the Tin Cup Creek drainage. A small herd of mountain goats winters in lower portions of the drainage and uses some of the high elevation basins and cliffs as summer range. The majority of goat use occurs

on the open, south-facing aspects. Ground-based human activity can disturb goats in hunted populations such as those in the Bitterroots, but they seem to be much more disturbed by aircraft flying low overhead (Nielsen, pers. comm., 1995).

IV. HUMAN ENVIRONMENT

A. Wilderness, Recreation, and Trails

The Bitterroot National Forest contains 508,000 acres of the Selway-Bitterroot Wilderness.

Direction for management of the Wilderness is contained in the Forest Plan. The Selway-Bitterroot direction is in the form of a Forest Plan amendment which was produced through the Limits of Acceptable Change (LAC) planning process. This process defines the "Desired Future Condition" for the wilderness and sets standards and direction for meeting that condition. Direction for recreation, trails, and airfields were included in this amendment which was completed in 1992. The LAC process continues for other resources such as wildlife, vegetation, air, soil, water, and special uses.

The Selway-Bitterroot Wilderness is the second largest wilderness in the lower 48 states and lies immediately north of the largest, the Frank Church River of No Return Wilderness. The Selway-Bitterroot Wilderness is 1.3 million acres in size and straddles the border of north central Idaho and western Montana.

The Bitterroot National Forest manages its portion according to standards found in Forest Plan Amendment #7. This wilderness is lightly to moderately used by the public throughout most of the season (May 1-November 30); however, it is heavily used during the fall big game hunting season from the first week in September through the last week in November.

The canyons on the west side of the wilderness bordering the Bitterroot Valley, such as the Tin Cup Creek canyon, are moderately to heavily used during most of the snow-free season. Rock climbing is gaining popularity in the west side canyons due to the high quality experience available. Stock use is popular in this wilderness. There is an extensive network of forest trails throughout three of the four opportunity classes. Opportunity Class 1 is pristine and maintained trails are prohibited.

A unique characteristic of this wilderness is the presence of irrigation dams which were established before the Wilderness Act was promulgated. There are 13 dams that are actively used and authorized.

The affected environment for this proposed project is within the Tin Cup Creek drainage. The area around the dam and reservoir, including the basin around the dam and the trail/road corridor leading to the dam, are within Opportunity Class 4 in the Selway-Bitterroot Wilderness. Characteristics are based on standards as described in the Forest Plan:

1. Resource Setting

Opportunity Class 4 is characterized by a predominantly unmodified natural environment. Natural conditions in many locations may be substantially affected by the actions of users. Environmental impacts are relatively high in areas along major travel routes, along popular river corridors and lake shores, and near major entry points, airfields, administrative sites, and private inholdings. Impacts often persist from year to year, and there may be moderate vegetation loss and soil disturbance at some sites. Impacts are readily apparent to most visitors.

2. Social Setting

Opportunities for exploring and experiencing isolation from the sights and sounds of humans are moderate to low. The probability of encountering other users is moderate to high. The user has the opportunity for a high degree of interaction with the natural environment, often with low or moderate challenge. Much of the time, contacts with other users will be relatively high on the trail, and moderately frequent at campsites.

3. Managerial Setting

Management strongly emphasizes sustaining the natural ecosystem. Contact of visitors within this class by Forest Service personnel will be either by invitation or to correct apparent potential problems. Formal rules and regulations may be necessary to achieve management objectives. Permits may be considered only when light-handed, less restrictive measures have failed to achieve desired goals and objectives. Closure orders and enforcement actions will be initiated when necessary. Signs within the wilderness will be placed to aid in distributing and dispersing use and for resource protection purposes. Trails will normally be constructed, maintained, and managed to accommodate heavy traffic for the majority of the use season. Administrative structures will be allowed as described in the section on "Administrative Activities and Facilities-Inside the Wilderness." Permanent structures may be provided only where absolutely necessary for resource protection and will use native materials. Temporary structures will be dismantled and completely removed when not in use.

The area in the immediate vicinity of Tin Cup Creek Reservoir is classified as a problem area. Problem areas are defined as "locations within the Selway-Bitterroot Wilderness where conditions do not meet one or more specified standards." Within this area there are six sites within a square mile.

A "site" includes any area of human impact, including discontinuous areas where use is likely to be by the same group, such as stock holding areas or separate tent pads. For purposes of determining sites per square mile, this also includes dams and administrative sites, but does not infer that either will be removed. Impacts are evaluated by using standardized procedures that gauge the degree of various impact parameters including vegetation loss, soil disturbance, damage to trees, developments, cleanliness, etc.

Of the six sites, one is classified as extremely impacted, two are heavily impacted, one is moderately impacted, and two are lightly impacted. The Forest Plan standard for areas in Opportunity Class 4 is: 1) a maximum of four sites

per square mile; and 2) of the sites in the area, a maximum allowable of one lightly impacted site, two moderately impacted sites, and one heavily or extremely impacted site per square mile. The Tin Cup Lake area exceeds both standards.

General wilderness resource characteristics of this drainage include the following summary of six categories:

1. Natural Integrity - The impacts of human activity are generally light with the exception of the Tin Cup Creek Dam and Reservoir and Tin Cup Creek Trail #96. The Tin Cup Creek Dam area is described above and those activities affecting it are regulated through a special-use permit.

2. Apparent Naturalness - Human activities are primarily confined to the narrow trail corridor traversing the drainage and the area immediately adjacent to the dam and reservoir. The remainder of the area is topographically extreme and discourages human activities, therefore having a high degree of apparent naturalness. Man has had a minor impact in those extreme areas through the suppression of wildfire.

3. Remoteness - The presence of man is readily apparent when visiting the areas within Opportunity Class 4, especially near the trail, dam, and near the problem areas around the reservoir. However, remoteness is experienced due to the travel time taken to access this area, the topographic relief, and the vegetation screening.

4. Solitude - Although the drainage within the wilderness experiences a low level of use, the feeling of solitude in its purest sense is not available within the trail corridor and adjacent to the dam and reservoir. This is due to the signs of man's presence such as the trail and the dam.

5. Special Features - Notable features within this area are its spectacular scenery, air quality, wildlife, and opportunities for wilderness related activities. These attributes also relate to the category of special places and values.

6. Manageability and Boundaries - The Selway-Bitterroot Wilderness lies within the Nez Perce, Clearwater, Bitterroot, and Lolo National Forests. General Management direction for the Selway-Bitterroot is contained in a document with that title prepared by the four Forests in 1982. This document was incorporated by reference into each Forest Plan and wilderness management standards in the individual plans were based on it.

4. Trails

The mainline trail traversing this area is the Tin Cup Creek Trail #96 which originates on Road #639 at a developed trailhead. Approximately three miles is outside wilderness from the trailhead to the wilderness boundary, and approximately eight miles traverses the drainage bottom to the Tin Cup Creek Reservoir. This is a well-used trail due to its point of origin and close proximity to Missoula and the Bitterroot Valley

communities. The first 3-5 miles of Trail #96 is fairly heavily used by day hikers with trail use becoming lighter further into the wilderness. It is maintained annually. Motorized use on the trail is prohibited by a Forest Supervisor's travel order.

In 1963, 1964, and 1968 a small D-4 sized dozer was walked to the dam along the trail. Evidence of the clearing completed for passage is evident along portions of the trail, especially through the talus fields, although many of the cuts have sloughed down. Portions of this trail are scheduled for reconstruction in 1998 for the purposes of safety and resource protection.

B. Cultural Resources

The area analyzed for cultural resources for this project includes all National Forest lands which may be impacted by project activities associated with any of the alternatives being considered. This "area of potential effect" includes areas where direct impacts will occur such as staging areas, the work camp, the dam, and any adjacent areas used for fill, rock borrow, etc. It also includes areas where project activities may have an indirect (visual, auditory, atmospheric) effect on significant cultural resources or their setting (e.g. timber harvest within the viewshed of an historic trail).

Within the area of potential effect, certain geographical areas were examined (surveyed) for cultural resources more intensively than others. Areas to be surveyed were selected by a cultural resource specialist based on knowledge of the cultural history of an area, previous ethnographic and/or archaeological work, and the topographic and environmental features of the area as related to the known patterns of prehistoric and historic use. This information is available in prehistoric and historic overviews of the Forest, the Forest's cultural resource files, the National Register of Historic Places, historic maps, ethnographic literature, and topographic maps. With this knowledge the specialist is able to predict prehistoric and historic site distribution. "Moderate to high probability" areas were most intensively examined; "low probability" areas received less intensive scrutiny.

The scope of the project's impacts were also considered when planning the "survey strategy." For example, an area to be logged with heavy machinery receives a more intensive archaeological inventory than an area to be horse-logged for post and poles. This more intensive inventory may include on-the-ground survey coverage of a larger percentage of the analysis area, clearing of the duff layers, and shovel testing in high probability areas. For a more detailed explanation of the archaeological survey strategy and procedure see The Prehistory of the Lolo and Bitterroot Forests (McLeod and Melton, 1986.)

The area analyzed for potential effect to cultural resources in the proposed Tin Cup Lake Dam Reconstruction project coincides with the areas at risk for ground disturbance through the proposed action. Areas of direct impact such as the dam, adjacent beach area, and potential camp and staging areas (a total of ten acres) received intensive pedestrian survey in the autumn of 1993 in connection with the proposed project. If the selected alternative for the proposed action will impact areas not previously surveyed in 1993, additional survey and shovel testing, will be conducted if necessary. The 1993 survey

identified areas along the original lakeshore within the area of potential effect where subsurface testing will be necessary prior to project implementation. This testing will require a low water level. The original stream floodplain/terrace at the upper (south) end of the lake was also surveyed in 1993. That area is outside the area of potential effect for this project but was considered to have moderate-to-high probability for prehistoric sites and had not previously been surveyed.

Site types known or expected to exist within or near the project area include the Tin Cup Dam (24RA542) (not eligible for the National Register due to loss of integrity); construction camp site(s) associated with the original dam and subsequent dam work; prehistoric sites along and above the original lake perimeter; and Tin Cup Trail #96 (24RA492) (believed to be eligible for the National Register).

A cultural resource inventory of the proposed Tin Cup Dam Reconstruction area (93-BR-2-10) was conducted in 1992 by Forest Archaeologist Joy Bolton, Archaeological Technician Vicki Varnum, and Terry Tanner of the Flathead Culture Committee of the Confederated Salish and Kootenai Tribes. During this inventory, 100% of the project's area of potential effect was surveyed, as well as areas at the south end of the lake outside the project area. In 1994 Vicki Varnum performed a cultural resource inventory of 14.6 miles of Tin Cup Trail #96 (94-BR-2-1), including the portion adjacent to Tin Cup Lake and Dam, in conjunction with BNF trail reconstruction work. In 1996, the dam itself was surveyed and recorded by Varnum. During these inventories, three sites were recorded within the area of potential effect: the dam (24RA542) which, as noted above, is not National Register-eligible due to loss of integrity; the adjacent portion of Tin Cup Trail #96 (24RA492); and a prehistoric site (24RA428). A possible historic site, perhaps a construction or hunting camp, was also noted northeast of the dam. A second prehistoric site (24RA429) was located approximately one half-mile outside the project area. The eligibility of the prehistoric sites has not been determined. Additional site testing for those sites and the possible construction camp site, and determinations of eligibility for them will be made prior to project implementation.

The 1992 survey (93-BR-2-10) specifically addressed the proposed Tin Cup Lake Dam Reconstruction now under consideration. This inventory, like all surveys on the Bitterroot National Forest, complied with standards established in the Secretary of the Interior's Guidelines for Archaeology and Historic Preservation. Before the survey was initiated, a literature search was conducted to determine what previous inventories had been conducted and what archaeological sites had been recorded within the area (see above). The literature search revealed that initial construction of Tin Cup Lake Dam occurred in 1908 and was completed by 1915. The dam has undergone repeated and extensive repairs and reconstruction over the past 80 years, including seven modifications since 1947 involving both upstream and downstream faces; the headgate, outlet, inlet, tower, and walkway structures; and the dike. The reconstruction has resulted in a loss of integrity of the original structure, making it ineligible for the National Register of Historic Places. The area around the dam was intensively surveyed for any remnants of the original dam and/or features associated with it.

A cultural resource inventory report documenting the literature search, definition of area of potential effects, and survey methods and results was written and sent to the State Historic Preservation Officer (SHPO). Consultation with SHPO concerning this project and its potential effects on significant cultural resources is currently underway and will be completed prior to the implementation of the project.

As required by the National Historic Preservation Act, the National Environmental Policy Act, and the American Indian Religious Freedom Act, consultation with Native Americans is also underway. The Salish Culture Committee, who represent the Bitterroot Salish, have been consulted during the planning stages of this project. In the summer of 1992, Culture Committee representative Terry Tanner participated in the Tin Cup Dam Cultural Resource Inventory (93-BR-2-10) with Forest Archaeologist Joy Bolton and Archaeological Technician Vicki Varnum.